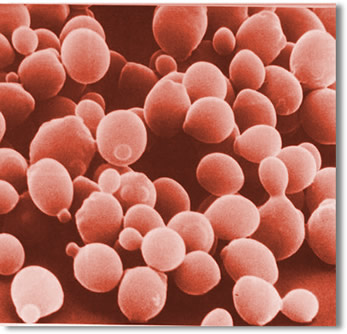
**Cell Respiration by Yeast**



BACKGROUND:

Yeast are tiny single-celled (unicellular) fungi. The organisms in the Kingdom Fungi are not capable of making their own food. Fungi, like any other organism, need food for energy. They rely on sugar found in their environment to provide them with this energy so that they can grow and reproduce.

Yeast, like bacteria grow in or on their food source. They produce and release digestive proteins (enzymes) into their environment where the sugar molecules are found. Complex sugar molecules then break down into monosaccharides that can be absorbed by the yeast and used for food (energy).

There are many species of yeast, and each has a particular food source. Certain yeast feed on a variety of natural sources of sugar such as fruits, nectar from plants, and molasses from the plant crop called sorghum. Others break down wood and corn stalks. In doing this, a compound called ethanol is produced. This compound can be used in our cars like gasoline. Another species break down sugar from grain into alcohol. Others break down fruits into wine, which is another type of alcohol. Bread recipes rely on yeast to break down sugar in flour.

Yeast is a facultative anaerobe, meaning that it can participate in aerobic respiration when possible, but when this is impossible, it respires anaerobically. When using yeast in making dough, the yeast will use the initial oxygen up very quickly and then start to respire anaerobically.  ATP will then be made via glycolysis, which requires no oxygen.  Without oxygen present, the yeast cells will quickly run out of NAD+ molecules which are vital to the process of glycolysis. To regenerate the NAD+, the yeast will undergo alcoholic fermentation, which converts pyruvic acid into CO2.as well as ethyl alcohol, with the NADH being oxidized in the process. Overall, the final equation for glycolysis plus fermentation would be:

**C6H12O6  🡪  2CO2 +  2C2H5OH,** with 2 ATP also produced.

For the yeast cell, this chemical reaction is necessary to produce the energy for life. The alcohol and the carbon dioxide are waste products produced by the yeast. It is these waste products that we take advantage of. The chemical reaction, known as fermentation can be watched and measured by the amount of carbon dioxide gas that is produced from the break down of glucose.

*Do you think that the rate of carbon dioxide production during fermentation would be affected by the availability of simple sugars? Explain.*